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APPALACHIAN FOREST EXPERIMENT STATION

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RELATION OF BYRAM HAZE METER READING TO SAFE VISIBILITY

3.104

DISTANCE OF SMOKE FROM AN EIGHTH-ACRE FIRE

By

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The Byram haze meter,<sup>1/</sup> an instrument widely used for estimating the visibility distances of smoke columns, is calibrated on the basis of a standard volume of smoke, approximately equivalent to the smoke produced by a 10- by 20-foot fire in Douglas fir or pine duff or by a 12- by 12-foot fire in hardwood leaves.<sup>2/</sup>

In the high rate of spread fuel types, predominating in the southern Appalachian Mountain forests, fires are normally one-eighth acre or larger at the acceptable discovery time of ten or fifteen minutes. Satisfactory detection can therefore be obtained if an organization is planned on the basis of visibility distances of one-eighth acre rather than 12- by 12-foot smokes.

The relation between the standard smoke and the smoke produced by an eighth-acre fire has been determined from photographs showing burning smoke candles and the progress of ten experimental fires allowed to burn to about one-quarter acre each. The test burns, made in April 1935, were photographed by C. A. Abell.

It was found that an eighth-acre fire in hardwood leaves produces a smoke approximately six times the diameter of the standard smoke or about 36 times its area. From known relations between area of smoke and haze meter readings, safe visibility distances were computed.

Readings made with a Byram haze meter may be converted into safe visibility distances of smokes from eighth-acre fires by reference to the attached table. Meter readings from 0 to 14 miles, by one-tenth mile units, and from 14 to 20 miles, by one-half or one mile units, are shown in column A. Corresponding safe visibility distances of the smoke produced by a one-eighth acre fire are given in column B.

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1/ Directions for using the Byram haze meter. Prepared by Pacific Northwest Forest Experiment Station, Portland, Oregon. May 1, 1937.

2/ Byram, George M. Relation of Byram haze meter reading to safe visibility distance of a small smoke. Technical Note 25, Appalachian Forest Experiment Station, Asheville, N. C. June 25, 1937,

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RELATION OF BYRAM HAZE METER READING TO SAFE VISIBILITY DISTANCE OF SMOKE  
FROM AN EIGHTH-ACRE FIRE<sup>1/</sup>

(All distances in miles and tenths)

Meter Read- ing	Safe Vis- ibility Distance	Meter Read- ing	Safe Vis- ibility Distance	Meter Read- ing	Safe Vis- ibility Distance	Meter Read- ing	Safe Vis- ibility Distance	Meter Read- ing	Safe Vis- ibility Distance
A	B	A	B	A	B	A	B	A	B
0.0	0.0	3.0	6.6	6.0	10.9	9.0	14.9	12.0	18.5
0.1	0.4	3.1	6.7	6.1	11.0	9.1	15.0	12.1	18.6
0.2	0.7	3.2	6.9	6.2	11.2	9.2	15.1	12.2	18.7
0.3	1.1	3.3	7.0	6.3	11.3	9.3	15.2	12.3	18.8
0.4	1.4	3.4	7.2	6.4	11.5	9.4	15.4	12.4	18.9
0.5	1.7	3.5	7.3	6.5	11.6	9.5	15.5	12.5	19.0
0.6	2.0	3.6	7.4	6.6	11.8	9.6	15.6	12.6	19.1
0.7	2.2	3.7	7.6	6.7	11.9	9.7	15.7	12.7	19.2
0.8	2.5	3.8	7.8	6.8	12.0	9.8	15.8	12.8	19.3
0.9	2.7	3.9	7.9	6.9	12.1	9.9	15.9	12.9	19.4
1.0	3.0	4.0	8.0	7.0	12.2	10.0	16.0	13.0	19.5
1.1	3.2	4.1	8.2	7.1	12.4	10.1	16.1	13.1	19.6
1.2	3.4	4.2	8.3	7.2	12.5	10.2	16.2	13.2	19.7
1.3	3.6	4.3	8.5	7.3	12.7	10.3	16.4	13.3	19.8
1.4	3.9	4.4	8.6	7.4	12.9	10.4	16.5	13.4	19.9
1.5	4.1	4.5	8.8	7.5	13.0	10.5	16.7	13.5	20.0
1.6	4.3	4.6	8.9	7.6	13.1	10.6	16.8	13.6	20.1
1.7	4.5	4.7	9.0	7.7	13.2	10.7	16.9	13.7	20.2
1.8	4.7	4.8	9.2	7.8	13.3	10.8	17.0	13.8	20.3
1.9	4.9	4.9	9.3	7.9	13.5	10.9	17.1	13.9	20.4
2.0	5.1	5.0	9.4	8.0	13.7	11.0	17.2	14.0	20.5
2.1	5.2	5.1	9.6	8.1	13.8	11.1	17.3	14.5	21.1
2.2	5.4	5.2	9.8	8.2	13.9	11.2	17.5	15.0	21.7
2.3	5.5	5.3	9.9	8.3	14.0	11.3	17.7	15.5	22.2
2.4	5.7	5.4	10.0	8.4	14.1	11.4	17.8	16.0	22.8
2.5	5.8	5.5	10.2	8.5	14.2	11.5	17.9	16.5	23.3
2.6	6.0	5.6	10.3	8.6	14.4	11.6	18.0	17.0	23.9
2.7	6.2	5.7	10.5	8.7	14.6	11.7	18.1	18.0	25.0
2.8	6.3	5.8	10.6	8.8	14.7	11.8	18.2	19.0	25.8
2.9	6.5	5.9	10.8	8.9	14.8	11.9	18.3	20.0	26.9

<sup>1/</sup> Applicable to fires in the hardwood leaf litter fuel type.